



LAB NEWS

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Special Issue

Technical Accomplishments 1981



Continuing a LAB NEWS feature started last year, *Technical Accomplishments 1981* sums up in one place what we, Sandia National Laboratories, consider to be our principal technical accomplishments for the year just past. This year's version is slimmer than last year's, but only because we set a limit on the total number of items—100—where last year there was no limit.

Accomplishments given here have been submitted by technical organizations in Albuquerque, Livemore and Tonopah. The department of origin is given in parentheses following each item. No attempt has been made to rank items.

Weapons

[Cover photo shows B83 test unit from Sandia Livermore moments after release from F111, with parachute beginning to deploy. It was taken at Tonopah Test Range by TTR photometrics personnel operating a long focal length, high-speed camera. The photo accompanies the item which follows.]

•We have completed two-thirds of the development of the B83 strategic bomb. The aeroballistic program is complete and demonstrates that aerodynamic and dispersion requirements are being met. Development components built at the production agencies have been tested in the laboratory at Area III test facilities, and at Tonopah Test Range. Many Albuquerque, Livermore, and Tonopah organizations are contributing to the B83 development, leading to initial production in 1983. (8150)

•Production was initiated for the W80-1 warhead for the Air Launched Cruise Missile (ALCM). We completed three joint flight tests with the ALCM and demonstrated compatibility with the first B52-G operational aircraft equipped with an offensive avionics system. We demonstrated the invulnerability of a W80 warhead to an induced direct lightning strike. (4340)

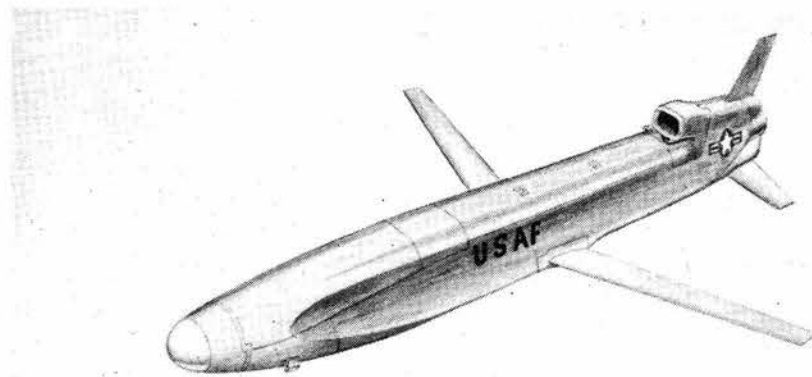
•The SE 1256 Flyaround Data System is a miniaturized data system that will be installed in B61, B57, B43, and B83 test units to record, monitor and control signals during flights on military aircraft. The system will record the events occurring on all lines between the aircraft and a weapon. Data can be read out and reduced immediately after a flight to assess the compatibility between aircraft and weapons. (4320)

•Advanced safing, arming and fuzing system development during 1981 has demonstrated the feasibility of a fuze that is both electrically and mechanically compatible with the two different reentry vehicles being considered for the MX. It includes a programmer incorporating a microprocessor, and a timer, radar, and integrating accelerometer coupled to provide a wide range of inertial and radar fuzing options. All subsystems for this fuze are now in advanced development. (4330)

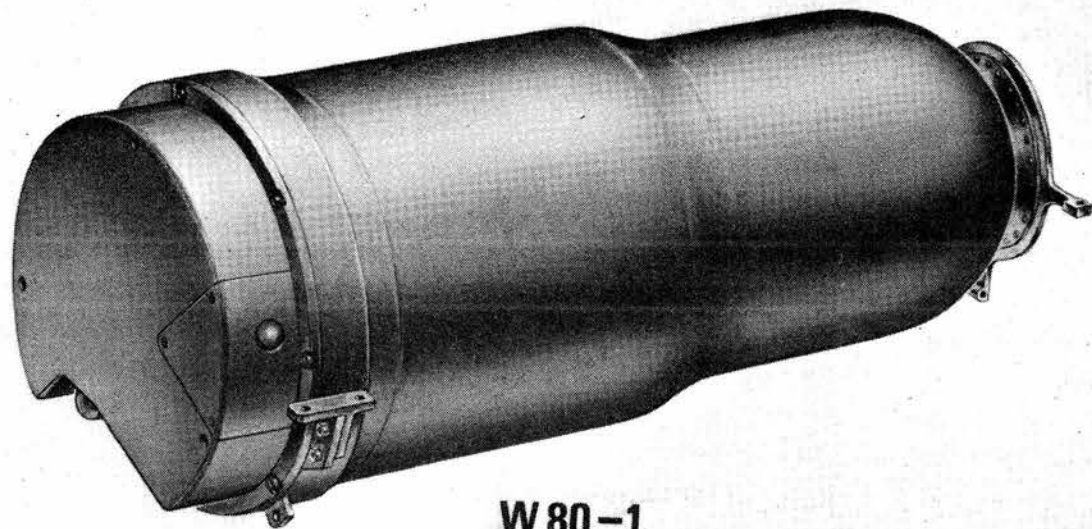
•The Primary Standards Laboratory has developed and put into operation a low frequency automatic network analyzer for measurement of low frequency impedance standards and a six-port reflectometer system for calibration of microwave measurement standards. In addition, two new systems were developed for calibration of gas leak rates while a photon counting pyrometer has been developed for calibration of temperature standards at values greater than 800°C. (2550)

•Using a new kind of electrochemical system, the feasibility of a thermal battery with high spin capability has been demonstrated. Batteries with high spin capability, required for artillery shell applications, give good performance at spin rates of 12,000 RPM and higher. This capability has been exceedingly difficult to obtain with the older Ca/CaCrO₄ electrochemical system. Some applications require spin rates as high as 18,000 RPM. Batteries using this new technology gave excellent performance while spinning at 18,000 RPM. (2520)

•Low voltage, hot-wire detonators offering increased safety of operation have been developed for weapon systems. These devices incorporate a relatively new compound as the explosive material. The deflagration reaction, initiated by a hot



ALCM



W80-1

FOR the Air Launched Cruise Missile, production got under way in 1981 for the W80-1. Three joint flight tests

were also completed in this program, a responsibility of Dept. 4340.

bridgewire, undergoes a transition to detonation. Such deflagration-to-detonation transition (DDT) devices exhibit high reliability to ignition and transition to detonation, while providing rapid function and output comparable to that achieved from other high order detonators. (2510)

•Division 2151 has developed a plug-in, nonvolatile, one-megabit, magnetic bubble memory module capable of operation in and/or surviving harsh environments including temperature extremes, shock, vibration, altitude, temperature shock, electromagnetic radiation, etc. The memory module (TA625), which contains the magnetic bubble memory plus support electronics, is packaged in a stainless steel, hermetically sealed container with a volume of approximately 18 cubic inches. (2150)

•Division 1112, in collaboration with the University of Hawaii, has designed, developed, and utilized a simple and efficient elliptically curved crystal spectrograph for the study of high-intensity pulsed radiation. The Bragg scattered x-ray spectra are recorded on commercially available film, using a removable camera attached to the spectrograph. This system has been used successfully in the study of radiation from laser-generated plasmas. (1110)

•A successful flight test of the penetration aids systems (PAS) II payload was carried out on the Western Test Range on Sept. 12, 1981. In this ICBM reentry test of two reentry vehicles, one was instrumented to evaluate advanced RV materials, new Sandia fuze designs, and RV dynamics during the reentry environment, while the other RV functioned as a target to generate radar data to be used in evaluating the LOADS antiballistic missile system. Both RVs survived reentry and impacted near the Kwajalein atoll. (5650)

•Ground shock and cratering have been successfully calculated for large high-explosive detonations near the ground. The calculations also provide information on the relationship of effects from nuclear detonations to those from high explosive detonations. (5530)

•A fragmentation model has been developed for describing fragment size distribution in materials undergoing tensile failure at high loading rates. The model provides an accurate prediction of fragment distributions for general loading conditions and has been verified for several different materials and loading geometries. It has been successfully used with computer simulations of the one-point detonation of weapons to determine the prompt fragmentation of nuclear material. This information is necessary for risk assessment of weapon material dispersal. (5530)

•A flight test of a navigation system, TARS (Terrain Aided Reckoning System), has been successful. The TARS system correlates radar altimeter measurements with a stored topographic reference map to estimate vehicle position. This position estimation process is updated by an onboard reference navigation system. While guidance systems of current cruise missiles employ a relatively expensive inertial navigation system, the reference navigation system of TARS is a simple dead reckoning system based on differential pressure airspeed sensors and a magnetic compass.

The flight test, performed on board a Beaver aircraft, showed that the aircraft position could be continuously estimated to an accuracy of several hundred feet by TARS. Possible applications include vehicles requiring a low-cost guidance system. (5620)

•Techniques, processes and equipment were developed to fabricate large quantities of multi-strand, continuous glass ceramic fiber for use in a structural application. A self-contained drawing tower, 16 feet high, was constructed for drawing molten glass materials into 143 individual small diameter (~10 micron) strands. Upon completion of this project, several thousand miles of various glass and glass ceramic compositions had been drawn into fiber. (1470)

•A concept was developed for mobile ICBM basing utilizing the Sandia/DOE Safe Secure Trailer technology. The work was presented to the Townes Panel (constituted by the Secretary of Defense to consider the MX basing alternatives), and was later

incorporated in a broader Air Force study for use by the Panel. (5610)

•The technology of ballistically matching nuclear artillery shells with their conventional high explosive counterparts has been developed to the point where it is possible to achieve a practical nuclear shell ballistically matched to a conventional round with a high degree of confidence. This allows a significant reduction in the number of test rounds required to prove ballistic similitude and eliminates the need for special spotting rounds, thus providing large savings. (5630)

•New design definition and dimensional acceptance criteria have been adopted for B83 components being produced at Rocky Flats. We are using certified tapes and tooling to significantly reduce the number of gages and inspection time. This reduction is made possible by the increasing reliability of computer-controlled machines and our increasing confidence in those systems. (8440)

•The technique developed at Sandia Livermore for non-destructively evaluating material strength via residual strain measurements using holographic interferometry has been successfully used at Rocky Flats for W79 component acceptance. This technique provides a powerful instrument to check individual parts for otherwise undetectable weak spots during normal acceptance testing. (8440/8520)

•A new apparatus enabling the simultaneous use of thermogravimetric, differential thermal analysis, and modulated beam mass spectrometry over a temperature range of 25°C to 1200°C has been developed. This apparatus, enclosed in an inert atmosphere glove box, will allow us to study in detail certain key gas-solid reaction kinetics. (8440)

•The first production unit of the W79 warhead for the new eight-inch atomic projectile was built in July. This artillery-fired projectile is the first designed to be ballistically similar to its conventional counterpart to maximize accuracy. The successful development effort is a result of the integrated efforts of the Army, LLNL, and SNL, with major contributions from the 2000, 5000, and 8000 organizations. (8110)

Technical Accomplishments 1981

•Development of the W70-3, the new enhanced radiation warhead for the Army's Lance missile system, was completed this year. Production has been started and initial deliveries have been made to the Army. Many organizations in both Albuquerque and Livermore contributed to this successful development effort. (8160)

•We have successfully demonstrated that inertia welding is a feasible method for fabricating a composite mid-case for the B83. Inertia welds of two high-strength martensitic steels (4330V/HP9-4-20) have been evaluated and shown to have an excellent combination of strength and toughness. Substitution of the 4330-V for HP9-4-20 will save money (approx. \$8.5 million) and strategic materials (cobalt and nickel). (8310)

•Hydrogen isotope imaging is a technique newly developed at Sandia Livermore for real-time, two-dimensional detection of hydrogen near a material surface. Direct observation of dynamic processes such as hydrogen diffusion, permeation, and absorption can be accomplished with this imaging. (8340)

Research/ Sciences

•Image processing is being used in many diverse applications at Sandia. One application is molecular imaging research. A series of high-contrast images, each representing a slice through the molecular cluster at varying heights above a reference plane, is obtained from a new microscopy. These images are combined and processed in Org: 2644's image processing facility to convey a realistic impression of the molecule's true shape. The microscopy was developed by Org: 5114. (2640)

•A method for dynamically testing various materials required a nickel-diamond surface on one side of a quartz crystal. A composite of nickel and diamond was produced using an electroless nickel bath doped with diamond particles which range in size from one micrometer to 30 micrometers. This technique resulted in a very thin composite layer having a high density of particles with uniform dispersion of quartz crystals. The composite layer functions as an energy transfer medium during dynamic testing of materials. In this instance, the effects of impact on 6061 aluminum cases were under study. (1470)

•The Kilauea Iki lava lake was drilled to a depth of 93 m and a partial melt zone was found. Seismic shots detonated there gave us the first in situ measurements of seismic velocity through a melt zone. Thermal convective experiments in the melt zone also gave us the first controlled in situ measurements on the interaction of water with a basaltic melt zone. Full water recovery (100%), high downhole steam temperatures (670°C), and high energy transfer rates (93 to 980 kW/m²) were observed in these thermal experiments. These seismic and thermal experiments have applications for the location of magma bodies in the earth's crust and for the efficient extraction of energy from these bodies. (4740)

•A theoretical basis for authenticating digital messages by means of a unique identifier has been formulated. The results are important in such diverse applications as verifying that a public computer file has not been altered, that the outputs of sensors monitoring sensitive operations have not been tampered with, or that the authorizing message for electronic funds transfers is genuine and timely. (5640)

•Models of deformation phenomena in the earth's crust have been applied to the interpretation of data obtained by precise earth surveying techniques in regions of earthquake or volcanic activity. These models can be applied on any scale to investigate subsidence in areas of large-scale mining or in regions of oil or water pumping. Various other physical processes have been investigated as well, including heat and ground water flow. These techniques have been used with success in explaining the spectacular deformation seen in Japan following great earthquakes, as well as the deformation that followed volcanic eruptions in Hawaii. (5540)

•Investigation has led to a description of the dynamic effects of microstructural shear band formation on the shock deformation of metals. These bands are regions of intense, local plastic deformation which substantially influence the behavior of materials subjected to high rate deformation. Both the physical nature of the bands in shock-loaded aluminum and their relation to mechanical properties of interest, such as shock strength, have been characterized. Theoretical studies have illustrated the connection between localized heating, which is thought to occur in the bands, to anomalous strength variations observed in shock wave experiments. These continuing studies aim at developing improved material understanding and, thus, improved computer codes to simulate weapons response. (5530/5830)

•We have developed a unique line-source electron beam annealing (LEBA) system. Line-source annealing can lead to significant reductions in processing times, compared to CW laser or e-beam swept spot annealing. The LEBA system has been demonstrated to give good annealing of implantation damage for dopant species in silicon without diffusional broadening of profiles; at the same time, it offers significantly fewer deep-level defects compared to other laser or electron beam sources. (5110)

•Research on a newly discovered organic superconductor has revealed oscillations in the magnetic field dependence of the resistivity. This discovery shows that transport in these materials is two-dimensional in character. This finding is important not only in the current controversy on the nature of superconductivity in organic materials but may also guide efforts to synthesize to achieve materials with higher superconducting transition temperatures. (5150)

•We made significant advances in understanding of the electronic structure of grain boundaries in polycrystalline semiconductors. We have calculated the barrier heights and recombination velocities at semiconductor grain boundaries subject to uniform illumination. The results of the calculations are in good agreement with silicon bicrystal measurements and have enhanced our understanding of polycrystalline silicon as a material for cheap, thin-film photovoltaic cells. (5130)

•We have demonstrated that ion implantation can be used to extend the photosensitivity of PLZT ceramics into the visible region on the spectrum. Because of this, we may now use the recently discovered photoferroelectric effect to store high quality photographs in PLZT ceramics by exposure to ordinary light (as opposed to the previously required ultraviolet source). (5110)

•Our new program, shock-induced solid state chemistry, has produced these developments: increased catalytic activity (by a factor of 10⁴ in TiO₂); enhanced sinterability of ferroelectric ceramics (may lead to improvement in electrical properties); major modification of the refractory powder silicon

nitride; revealed that non-equilibrium shock processes are important in polymers (dielectric properties) and organic materials related to explosives. These results underscore the importance of enhanced chemical reactivity in solids in direct-shock and post-shock environments and suggest the need for revision of material descriptions used in numerical modeling of shock processes. (5130)

•Naturally radioactive minerals have been investigated using high resolution transmission electron microscopy (resolution ≈ 1.4 Å fringe to fringe) in order to determine the effects of radiation damage on the crystal structure. Samples which had received doses greater than $\sim 10^{19}$ a particles/gm were found to be amorphous with long-range order not exceeding 10 Å. (This work was performed as part of the investigation of radiation effects in solidified radioactive waste forms.) (5820)

•We developed a glass a hundred times more resistant to corrosion by the lithium found in lithium/SO₂ cells than that used in commercial seals. The improved glass and other cell improvements made by the Division 2523 staff extended the cell life to more than five years. The glass contains a relatively high concentration of oxides stable with regard to reaction with lithium but can be sealed at temperatures attainable in commercial sealing furnaces. More than 5000 seals have been made to support Sandia programs, and the glass is being evaluated by several cell suppliers for commercial use. (5840)

•We have discovered a new and important mechanism of precipitation of helium atoms in a metal lattice. This mechanism involves actual displacement of host atoms in a metal by clustered helium atoms in the absence of radiation damage. Theoretical predictions are confirmed by sub-threshold damage implantation and by tritium decay measurements in our tritium research laboratory. (8340)

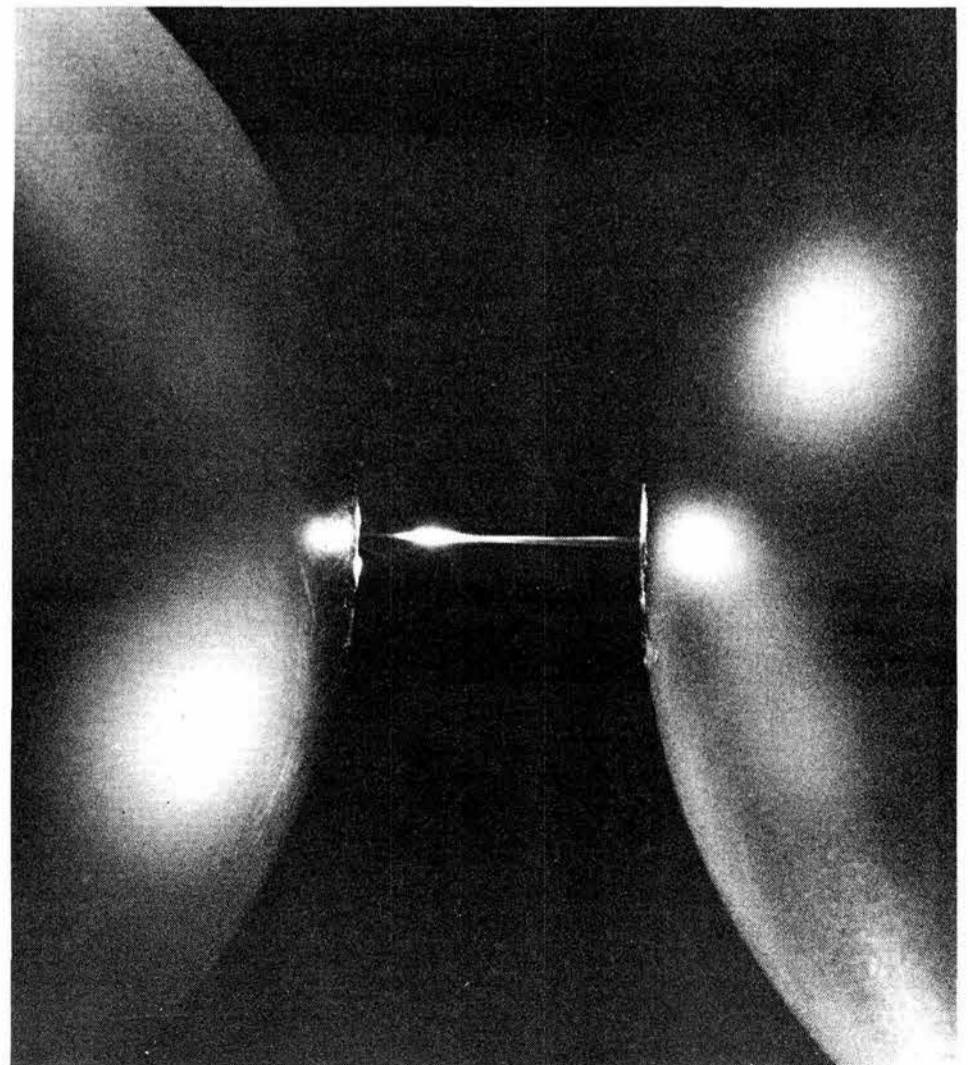
•A combined experimental and theoretical effort has addressed fundamental processes involved in near-threshold photon and electron stimulated desorption (PSD and ESD) of hydrogen from metal surfaces. Because PSD and ESD are particularly sensitive to hydrogen, new insight regarding metal-hydrogen bonding is offered. Based on comparison of results of quantum chemical cluster calculations with experimental threshold and kinetic energy data, we have proposed a surface predissociation mechanism, involving removal of both electrons from the metal-hydrogen bonding orbital. (8340)

•We made the first successful studies of the configuration and electronic properties of substitutional nitrogen atoms in silicon. Nitrogen was introduced into silicon by ion implantation and quenched onto substitutional lattice sites by laser annealing. This work received the Outstanding Scientific Accomplishment award in the 1981 BES Materials Sciences Research Competition. (5110)

Pulsed Power Development

•UV laser triggering of multi-megavolt gas switches has been investigated for use in PBFA and other large pulsed power generators. Our results indicate that this scheme may be the best way to trigger large modular pulse power systems that require

good simultaneity of switch closure. As an example, studies of a 2.8-MV SF₆-insulated switch pulse charged to 80% of its self-breakdown voltage, demonstrated a 1- σ jitter of only 0.3 ns using 0.028 Joules of KrF laser energy. Further, the triggering delay is



TO TRIGGER multi-megavolt gas switches in the pulsed power development program (Dept. 4210), use of an ultraviolet laser appears to offer advantages. In this photo, a UV laser-induced breakdown arc is shown between the electrodes of an SF₆ insulated gas switch. Results show reduced jitter and a triggering delay very insensitive to voltage.

very insensitive to voltage, changing only 0.9 ns for a 10% change in voltage. (4210)

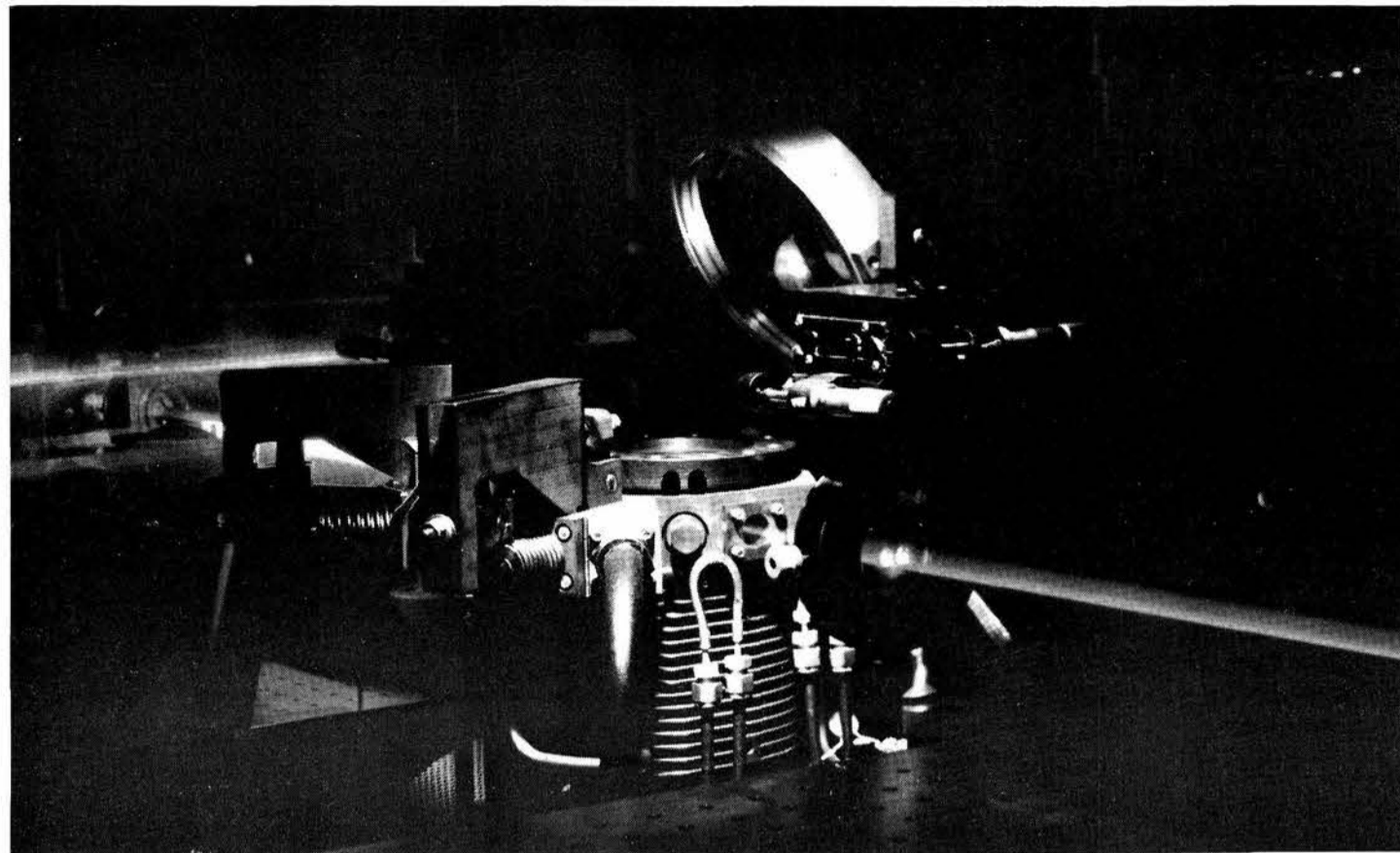
•Goal of Scorpio is to use x-rays produced by fast imploding liners to drive inertial confinement fusion targets. A new magnetically insulated post-hold convolute was successfully developed on Proto II to drive the Scorpio load. The use of this convolute resulted in Proto II inductance and impedance reductions of 25 and 50%, respectively, allowing a 70% increase in the energy delivered to the load. Power is transported through this convolute with an efficiency of over 85%. This allowed us to test the scaling of the kinetic energy of the liner implosion with current up to 60 kJ and 4.8 mA. (4230)

•Two very high-current, electron, linear accelerators—MABE and RADLAC II—are being developed for gamma ray simulation and particle beam weapons applications. MABE (Megamp Accelerator and Beam Experiment), a module of a 15 MV, 1.1 MA simulation accelerator, was constructed, and the design of the RADLAC II accelerator was completed. This accelerator will be used to assess the feasibility of generating 100 kA electron beams with arbitrarily high energies. (4250)

Energy

•Construction of the performance prototype trough was completed. This 320-foot string of parabolic trough collectors represents the basic building block for a line-focus solar thermal system. The four different reflector/structure concepts utilize automotive-type manufacturing processes. A similar collector, developed by SNL, achieved 70% thermal efficiency at 600°F representing the highest performance ever recorded for a trough. The goal of the program has been to establish a technology base and, at the same time, to exhibit collectors offering high performance and durability while using common materials and economic processes. Over the past four years, SNL has provided design engineering and process development while industry has supplied manufacturing expertise. (2540/4710)

•An instrument was designed and built to provide radioactive analyses of rock drill



WHAT goes on inside a cylinder of an operating diesel engine? At the Combustion Research Center in Sandia Livermore, researchers are finding out through use of a

triple laser beam, focused inside the combustion chamber.

cores. This equipment provides three kinds of information for the geologist: 1) on-the-spot lithologic descriptions, 2) close matches of drill core to well log depth, and 3) precise well control. The mechanical design was provided by Division 1125, electronics by Division 3313, and program coordination by Division 4753. (1120/3310/4750)

•Designed to enhance recovery of crude oil of high viscosity, two downhole steam generators, one burning diesel oil/oxygen and the second burning diesel oil/air and located 2000 feet underground (in the well), were put into operation in an oil field in Long Beach, Calif. Production wells are monitored for oil production changes and for evidence of combustion gases in the oil from the downhole generator. Each generator is producing steam at a nominal 1250 psi and 500°F; energy output of each is about four million BTU/hr. (4750)

•A program to develop high-temperature electronics and instrumentation for geothermal applications has been completed. It has resulted in several tools and many

components which can withstand temperatures in the 275°C range. (4741)

•A process to produce an anti-reflective film on 12-foot-long, heat-resistant glass envelopes was achieved by the Glass Lab, 1472-3. The film increases the glass solar transmission from 92 to 98%, thereby increasing the efficiency of the line-focus parabolic trough from 60 to 70% at an output of 315°C. This efficiency exceeds the long-term goal established by the DOE. (1470)

•Titanate ceramic waste forms have been developed at Sandia for immobilizing high-level radioactive waste of the type generated in commercial fuel reprocessing. Dissolved radionuclides are sorbed by an inorganic titanate ion exchange material which is subsequently hot pressed to form ceramics several orders of magnitude more resistant to aqueous attack than comparable vitrified waste forms. Sandia processing methods are being adopted in the preparation of a similar titanate waste form (SYNROC) in programs at LLNL and the Australian AEC. (5840)

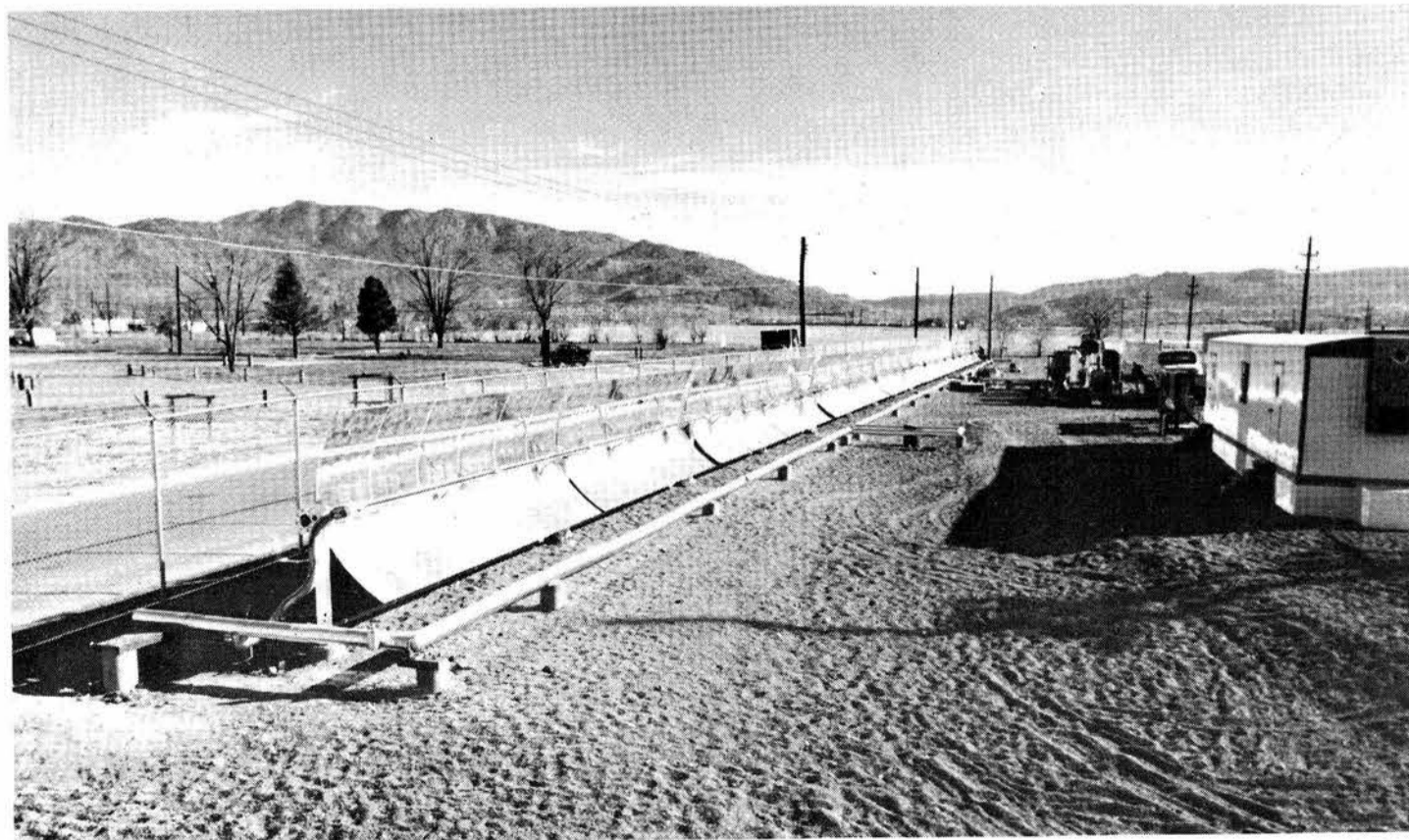
•Temperatures and carbon-monoxide concentrations were measured in the soot-filled combustion chamber of an operating engine by applying coherent anti-Stokes Raman scattering. For combustion diagnostics, this technique can be applied in extreme engine environments, such as inside the combustion chamber of a diesel engine. (8520/8340)

•The geological characterization of an additional site at Big Hill, Texas, for the Strategic Petroleum Reserve was completed. This characterization included an accurate determination of the geometry of the salt dome and surrounding media which was used to design and locate 14 oil storage caverns within the salt dome, each with a capacity of 10 million barrels. Leaching plans for developing these caverns were developed for a range of crude oil deliveries in the late '80s. Construction is scheduled to start in FY 83. (4540)

•We completed designs of a rail and truck transuranic waste packaging transporter (TRUPACT) and performed the necessary thermal and structural analysis and testing. TRUPACT will be used to transport TRU contact-handled wastes (containers may be handled by personnel) within the DOE complex, and a prototype truck-sized fleet, capable of also being carried by rail, will be in operation by late FY 84. (4550)

•A method was developed for identifying and rating potential locations for a geologic repository for nuclear waste at the Nevada Test Site. The method evaluates data on geological, environmental and rock properties according to a set of performance objectives for waste disposal. Alternate evaluations, performed on an APPLICON Graphics System, allow users to investigate the effects of data uncertainties and assumptions about relative weights assigned to various performance objectives. The method was designed to highlight graphically the logic and data used in repository site selection, anticipating the possible licensing by NRC of a facility at the NTS. (4530)

•The seabed disposal program has completed a 30-day, 0.286-scale laboratory simulation of an in situ heat transfer experiment (ISHTE) to be deployed in the deep ocean 600 nautical miles north of Hawaii in 1985. The purpose of ISHTE is to study the thermal, mechanical, and geochemical responses of the ocean sediment to the introduction of high-temperature heat sources. The 30-day period for the labora-



ECONOMY model of parabolic trough collector was completed in 1981 by Depts. 2540 and 4710. The 320-foot string represents basic building block for line-focus solar

thermal system, offers high performance and durability while using common materials and economic fabricating processes.

tory simulation experiment is equivalent to the one-year field test period for ISHTE. A large tank of reconsolidated sediment was maintained at 8000 psi and 4°C to duplicate the ISHTE deep ocean conditions. Sediment response to a heater in the tank was measured. Results to date indicate that the laboratory test is a good simulation of ocean floor conditions. (4510)

- With fabrication of a 100W photovoltaic concentrator module, Sandia has taken a major step toward practical solar electric power technology. Using acrylic lenses to focus sunlight onto solar cells at a concentration ratio of about 70, the module requires approximately 1/70 as much solar cell area as a flat plate photovoltaic collector producing the same electrical power. It thus realizes a significant economy because the solar cell area largely determines overall cost. For necessary sun-tracking, groups of these modules can be mounted on azimuth-elevation pedestals, or tilt and roll tracking racks, at array power levels ranging from 0.5 to 10kW. An advantage of photovoltaic concentrator technology is that the cells operate more efficiently under concentration. For example, this module is about 30% more efficient than flat plate photovoltaic collectors. Three firms are working on improved versions of the module which they hope to offer as commercial electric power generators. (4724)

- We published the "Solar Power Tower Design Guide" (SAND81-8005), containing information necessary to perform preliminary evaluations of solar thermal central receiver plants. A potential user can determine the technical feasibility and possible economic return for a specific application. The cost elements, performance, and operation of solar central receiver systems are described. (8450)

- A unique two-color pyrometer diagnostic system was developed which permits the surface temperature of single reacting (and non-reacting) coal (or ash) particles to be measured under combustion conditions. The diagnostic system was used to obtain detailed histograms of the temperatures of coal, char and coke particles in a laboratory study of the relative reactivity of these fuels. (8520)

- A novel diagnostic system was developed based on the tapered element oscillating microbalance device. The system permits

real-time measurement of the accumulation of particulates in a process stream at high temperature and pressure. *Pollution Engineering* magazine presented its 5-star award in recognition of this contribution. (8520)

- Cross correlations between the fluctuating velocity and temperature fields of a turbulent diffusion flame were measured using optical probes. This is the first known application of this technique in combustion research. (8520)

- Progress in understanding sooting hydrocarbon-air flames was made during study of the chemistry of combustion products by Fourier transform infrared (FTIR) spectroscopy. With propane as the fuel, absorption bands were noted arising from formation of higher molecular weight unsaturated organic molecules. Such species may be precursors of macroscopic soot particles because the maximum band intensity occurred in the region of the flame just below the intensely luminous yellow zone. (8310)

- The use of catalytic surfaces to promote combustion reactions is a promising method of burning a variety of fuels efficiently while minimizing pollutant formation. Most of the important physical and chemical processes found in large-scale catalytic combustors can be found in a combustion boundary layer apparatus. In experiments, laser fluorescence and Rayleigh scattering techniques were applied to measure hydroxyl radical concentrations and temperatures of the combustion processes near a catalytic surface. Significant differences in the structure of the combustion boundary layers were observed owing to the variation in the catalytic effects of the two surfaces. (8510)

- An economical incentive exists to use nitrate salts in solar power systems as heat transfer and storage media. However, technical uncertainties regarding salt stability and corrosion have hindered acceptance and development of such systems. A research program has been completed which resulted in thorough understanding of nitrate salt behavior in a solar power system environment. Our results show salt stability and corrosion issues to be insignificant as long as the system operating temperature is controlled to less than 600°C. (8310)

Components

- Design and testing is nearing completion on the newest generation of electronic coded switch. Designed for the Ground Launched Cruise Missile (GLCM), this coded switch has a larger code population than before along with increased diagnostic capabilities. The design is microprocessor-based, taking advantage of Sandia's radiation-hardened microelectronics and custom nonvolatile semiconductor memory capability. This new coded switch will accomplish not only the usual warhead arming security function but substantial aspects of GLCM launch control as well, at a lower cost than previously designed electronic coded switches. (2331/4360)

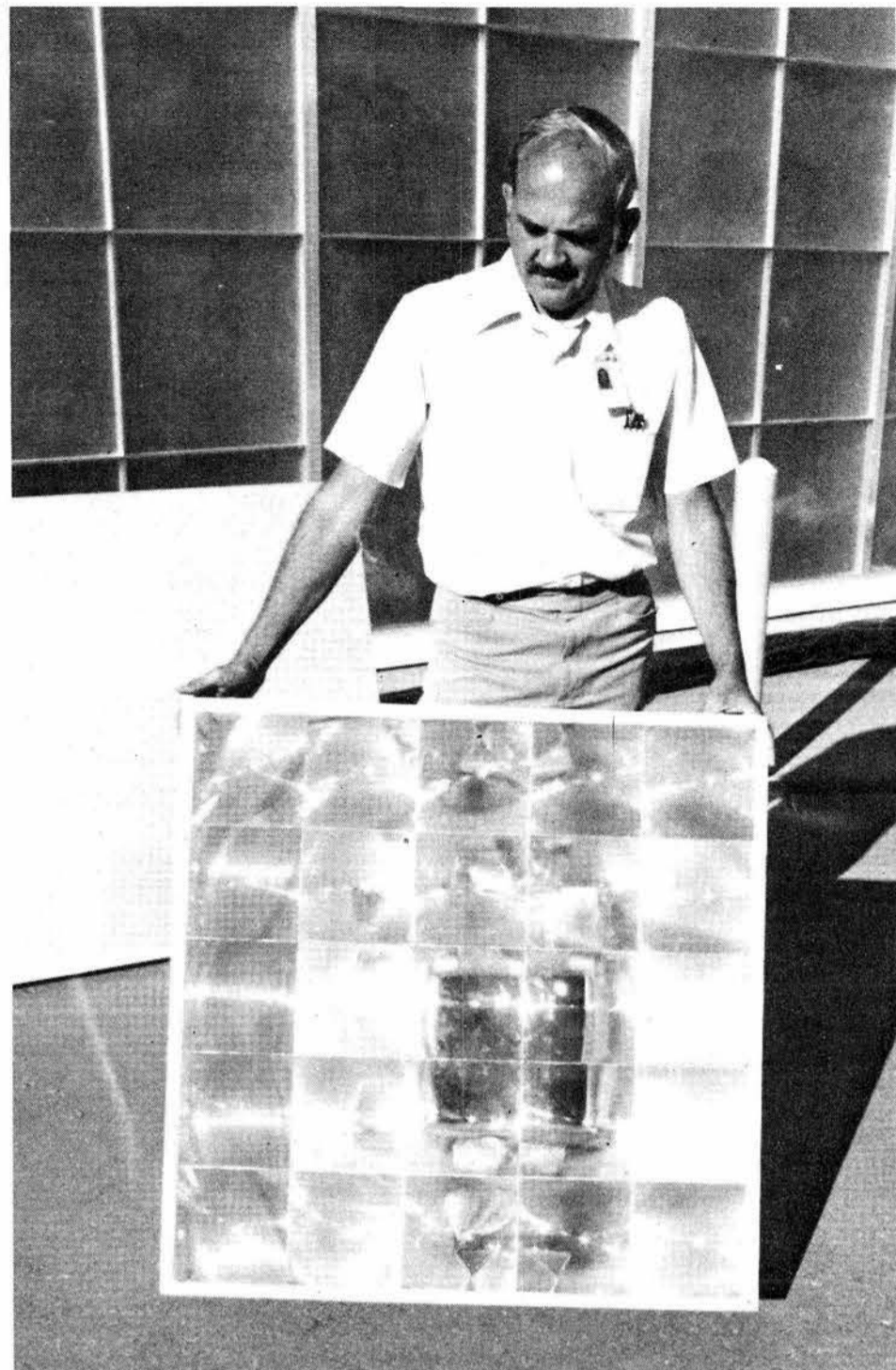
- We showed that the behavior under radiation of Sandia's radiation-hardened integrated circuits is much different for the lower dose rates of applications in spacecraft than it is for the higher dose rates of normal laboratory testing. The lower dose rate resulted in slowing down of the parts but there was no increase in power consumption as is commonly seen in laboratory testing. This is important for limited power spacecraft. (2140)

- The Semiconductor Development Laboratory has successfully processed the first

integrated circuits designed at Sandia with three micrometer minimum feature size. This processing capability is necessary to build Sandia's radiation-hardened version of the Intel 8085 microprocessor, scheduled for completion by the end of 1982. (2140)

- Low pressure chemical vapor deposition (LPCVD) of Si₃N₄ layers has improved the performance and reproducibility of Metal-Nitride-Oxide-Semiconductor (MNOS) non-volatile memory devices. Compared to the old atmospheric pressure deposition, LPCVD fabricated devices can withstand over 20 years of additional write/erase cycling. Furthermore, the reproducibility of the writing/retention of information storage is very much improved. (2140)

- Final design and testing has been completed on the first intent-enabled Trajectory Sensing Signal Generator (TSSG), to be used in the B83 bomb. This safety component uses microprocessor-based logic to process the pilot-generated intent-to-release signal along with information relating to programmed weapon release and trajectory acceleration, thereby assuring pilot intent and proper performance of the weapon before final arming can occur. The design uses modern radiation-hardened micro-



PHOTOVOLTAIC concentrator module, held here by Howard Gerwin (4721), uses acrylic lenses to focus sunlight onto solar cells, requires about 1/70 as much solar cell area as a flat plate PV collector producing the same electrical power.

electronics and acceleration sensors to assure a safe nuclear weapons stockpile. (2330)

- New control equipment has been designed to provide easier and more secure handling of classified information associated with the coded control nuclear weapons. The new controller is the first to incorporate an electronic cryptographic system and to automatically recode a weapon without requiring that the operator know any part of the release code. It also has the flexibility of allowing new communication formats in future weapons without major impact on this controller design. The controller utilizes a microprocessor and several electronic memory technologies. It is scheduled for fielding in 1983. (2330)

- An advanced inertial navigation system (INS) has been developed for the navigation, guidance and control of exploratory missile systems. Attitude control of spinning reentry vehicles and sounding rocket payloads is another capability. The new INS utilizes RIMS II, a spin-stabilized, tune-rotor, gyro-based inertial measurement system designed and developed in Dept. 2330, in combination with an advanced Sandia airborne computer, called SANDAC IV. SANDAC IV provides a seven-fold increase in capacity over the stand-alone microprocessor; this is necessary to satisfy real-time requirements for navigation, guidance and control of high performance RVs. (2330)

- An arsenic activation neutron detector has achieved an accuracy of $\pm 25\%$ for the detection of 2.5 MeV neutrons from the D-D nuclear reaction. This detector represents significant improvements over existing detectors: it is faster in response time by a

factor of 1000 and is less sensitive to scattered neutrons. The arsenic detector can also be used to detect neutrons of energies greater than 2.5 MeV such as 14 MeV neutrons resulting from the D-T nuclear reaction. (2560)

- A process has been developed to prepare complex-shaped dielectric film. The new film could be used to fabricate an energy-storage capacitor around the outside of a firing set. This design could improve the safety of nuclear weapons. Test units have been fabricated on aluminum canisters having diameter 15 cm, height 12 cm, and a tapered sidewall. One unit, consisting of three layers of dielectric and four layers of vapor-deposited aluminum had 0.1 μ f capacitance and 7 kV breakdown voltage. (5810)

- We have succeeded in designing and building a compound semiconductor photodetector for use as a receiver in optoelectronic links. The device was fabricated in the Org. 5100 Compound Semiconductor Laboratory. Tests of the device in SNLA's Area V radiation facilities show that the device is 1000 times less sensitive to ionizing radiation than other available devices while still remaining a good photodetector. (5130)

- A model describing self-propagating, solid-solid alloying reactions has been formulated at SNLL. In general, these phenomena exhibit very sharp burn fronts and steep temperature gradients which necessitate development of novel numerical techniques to solve the equations. Initial calculations have already identified those experiments needed to verify the models and this work is now under way. (8340/8330)

Safeguards

•At the Army's request, a Sandia-designed igloo access denial system has been developed and installed at an overseas site. The Army, with Sandia support, is conducting adversary effectiveness testing in the US as well as operational testing at the overseas installation. Testing to date indicates that the system will meet the Army's operational capability requirements. (1720)

•The PAT-2 package (Plutonium Air Transportable Model 2), developed in the LAARC (Lightweight Air-Transportable Accident Resistant Container) project, has been licensed by the NRC and the DOT. PAT-2 may now be used for the international air shipment of plutonium assay samples, in support of the Non Proliferation Treaty. Japan is preparing to use the PAT-2, as is the IAEA in Vienna, Austria. (1720)

•For remote use at an installation, we have developed an acoustic helicopter

detector designed to detect helicopters in their final landing phase and at short-range (within 100 meters). This short detection range allows use of a simple acoustic detection algorithm without making the system sensitive to other sources of acoustic energy. (1730/1760)

•We developed and established a production capability for an in situ fiber optic seal for containers and other equipment as a potential replacement for the Type E seal used for international safeguards. A prototype seal and recorder/verifier were demonstrated to the international safeguards community (IAEA and EURATOM), and approval to proceed with the fabrication of preproduction seals and recorder/verifiers was obtained from the DOE/OSS. The preproduction material (IAEA Class III) will be furnished to the IAEA in February 1982 for field evaluation. (1750)

Reactor Safety

•The first experiments in a jointly sponsored (NRC-KfK) international (US & Germany) program on fuel failure in liquid metal fast breeder reactors (LMFBR) were completed this year. These fuel disruption experiments use high-speed photography to observe the fuel heatups and failures under accident conditions simulated in Sandia's annular core research reactor. Results showed that current safety codes do not account for either the clad removal mode or the extensive fuel swelling and slumping observed, which may alter the early accident progression and severity. (4420)

•Significant progress has been made in characterizing the threat of hydrogen generated during accidents in commercial nuclear reactors. Computational tools for predicting pressures and temperatures due to deflagrations and detonations in various accident scenarios have been developed and validated in a limited set of experiments. Proposed deliberate ignition systems, designed to mitigate consequences by burning hydrogen as it is released from the reactor, have been assessed for two plants. Information on this subject was exchanged at a three-day workshop held in Albuquerque where 44 papers were presented to 200 participants from nine countries. (4440)

•Probabilistic risk assessments of four operating nuclear power plants were performed in the Interim Reliability Evaluation Program. In these analyses, an investigation was made of the reactor systems to identify accident sequences presenting the greatest risk to public health and safety. Plant equipment failures and operational errors that could lead to severe accidents were identified. They will become a focus for improving plant safety. Procedures for conducting similar assessments of all operating plants for the purpose of improving the safety of nuclear power plants are currently being developed. (4410)

•Experiments to investigate the coolability of damaged reactor cores indicate that debris beds which are size stratified are significantly less coolable than those in which the debris is uniformly distributed. Stratification in particle size is the most probably configuration resulting from a severe LMFBR accident. A model has been developed to predict coolability limits for damaged reactor cores. The model accounts for the coolability of self-heated particulate beds in the presence of saturated or subcooled overlying coolants. It predicts bed temperatures and surface heat fluxes throughout the single- and two-phase

regions and predicts the onset of dryout, initial dryout locations and post-dryout bed temperature fields. The model has been tested against the known data base worldwide, and compares very favorably to any other model in predicting bed coolability. (4420)

•An experimentally verified model of liquid sodium interactions with siliceous concrete has been developed. This model is to be used for analysis of sodium spills on concrete in breeder reactor plants. The interaction of sodium with concrete constitutes one of the most important safety concerns of breeders. The model, called SCAM, predicts gas generation, temperatures and concrete erosion during the interactions. It also predicts a sharp pressure dependence in these processes. This prediction has been experimentally confirmed. (4420)

Reimbursable

•A thermal/flashblindness protective window prototype has been designed and fabricated for initial tests in USAF long-range bombers. Our efforts in the areas of hot pressing, shaping, electroding and bonding have produced a lens with a viewing aperture 2.25 times greater than that of the present EEU-2A/P goggle, now being produced for SAC. Laboratory tests on this six-inch diameter device have been successfully completed. (2520)

•A remotely programmable insulin delivery system has been implanted in a diabetic human for the first time, the result of a cooperative program between the UNM Medical School and Sandia. This followed two years of animal implantation studies. The implanted system consists of a rotary solenoid-driven peristaltic pump, control electronics, batteries, and communications coil, all in a welded titanium housing, and an attached refillable insulin reservoir. It is controlled using a hand-held programmer. The system delivers insulin over a wide range of background and mealtime rates. This has resulted in normalization of the implanted patient's blood sugar for the past 10 months. The system has the potential for use in treating a variety of conditions besides diabetes, including cancer, cardiovascular problems, and chronic pain, among others. Transfer of this technology to the private sector has begun. (2330)

Testing

•Recent success in efficiently transporting relativistic electron beams to a bremsstrahlung converter means that multiple-module, large dose-area, flash x-ray simulators can be built. The electron beam is transported in a magnetic field generated by a current driven along an axial rod. The gradient-B drift transport method used in these studies allows control over the beam pulse width through bunching to get appropriate dose and dose rate values simultaneously. Advanced converter concepts also allow changes in the radiation spectra. (4230)

•A full-scale lightning simulator has been developed for lightning tests on Sandia weapon systems. The simulator can produce multiple high-current lightning strokes or a continuing current, using PBFA-type Marx generators for the high current pulses and diesel locomotive traction motors for the continuing current phase. The first test was conducted on the W80, with tests to follow on other systems. The simulator can produce multiple pulses, the first pulse of 200 kiloamp peak amplitude, with each pulse rising to peak in two microseconds and decaying with a 75 microsecond time constant, plus a continuing current of 300 amperes for one second. This provides a Sandia capability in this area unmatched

anywhere in the world. (1550)

•The terminal guidance and impact accuracy of the Tomahawk cruise missile was tested at the Tonopah Test Range during the past year. This DoD-funded program utilized the precision trajectory measurement system at TTR to evaluate the accuracy of the land attack version of the Tomahawk. Absolute position of the submarine launched missile was defined to within 1.5 feet over the terminal phase of the 500-mile flight. Real-time data processing from the onboard telemetry system by the TTR computer allowed in-flight monitoring and evaluation of missile performance through the use of interactive cathode ray tube displays and chart recorders. Included in this processing was the real-time linking of the missile guidance data to the TTR target-acquisition system. This enabled the initial tracking of the missile at the various range instrumentation sites. (1170)

•A computer-based ultrasonics research facility is being used to develop non-destructive techniques to determine stress states in materials and welds. Early results of this research, which utilizes sophisticated signal processing techniques, indicate that a correlation exists between the applied stress in aluminum and the attenuation of ultrasound. (8440)

Computing

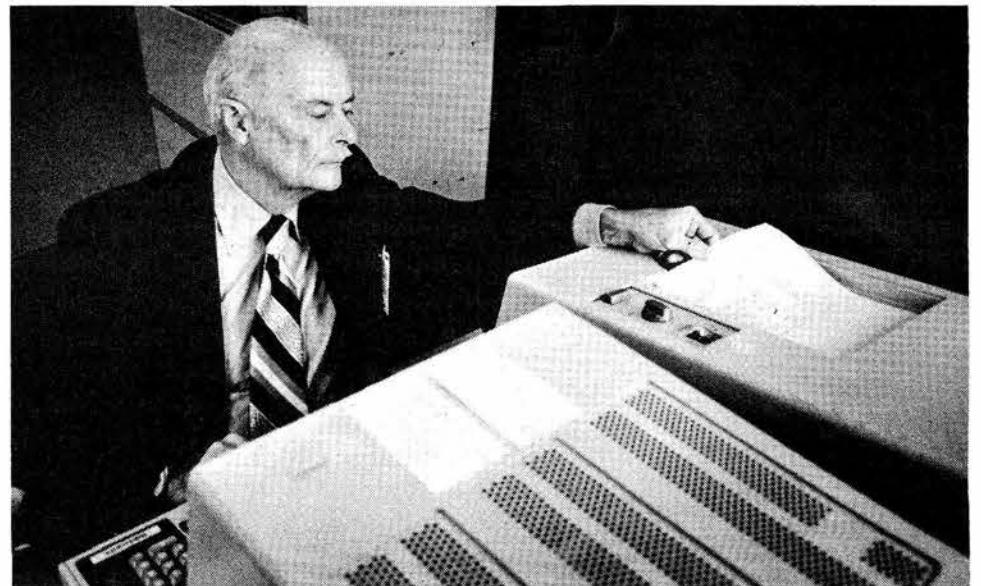
•A retirement system program was recently adapted for the UNIVAC 1100-82. It is used by the Sandia Benefits organization in its administration of the Sandia Retirement Plan. A major feature is the interactive pension estimate program. With this, the retirement counselor simply enters the employee's E-number and planned termination date, and the program will retrieve information from the data base, perform some 250 calculations to estimate benefits under each of the plan formulas, and return the results in a matter of seconds. (2626)

•An integrated file storage system for the central computing facilities is now available; it consists of disks, a cartridge storage device, and an automatic tape library yielding a 200-fold increase in the capacity of on-line computer data storage. Software to give access to this large data storage device and to bring it into the network of the central computing facility computers is under development and will be finished for the CYB76 and UNIVAC 1100-82 in CY 82. (2640)

•Data communications between Bldg. 880 and 802 are being shifted from twisted pairs

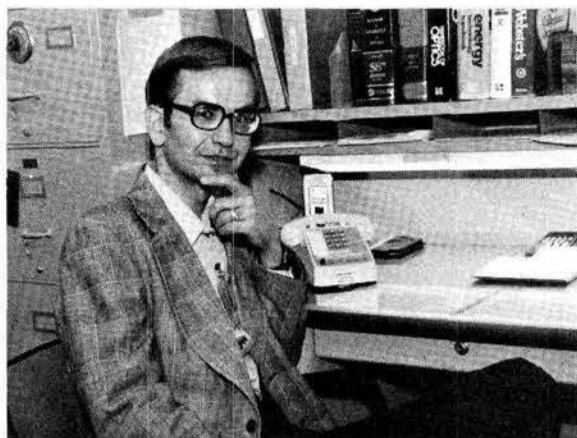
of copper wires to an optical fiber cable. Both low-speed terminal-to-computer and high-speed inter-computer links have been operational for a few months. This is the first leg of a proposed loop around Tech Area 1. The cable consists of 144 single fibers, each having bandwidth of several hundred megahertz. This system will provide the security, capacity and flexibility required for future data needs while taking maximum advantage of limited underground conduit space. (2640)

•Remote job entry software has been developed by Division 2644 that allows interactive users of VAX Distributed Computers to submit jobs for batch execution on the large scientific mainframes in the Central Computing Facility. Output is automatically returned to the user's files on the VAX. Both test and binary data may be transmitted to and from the CCF at 50K bits/second. The user interface is designed to be "friendly" and easy to use. Users are notified when their jobs are received by the mainframes and when their output files are received by the VAX. (2640)



SANDIA RETIREMENT COUNSELOR Vern Henning (3543) uses a new program developed by Division 2626 to provide "instant" retirement information for individual employees. Vern enters the employee's E-number and proposed retirement date, and the program computes some 250 factors to provide the information.

Supervisory Appointments



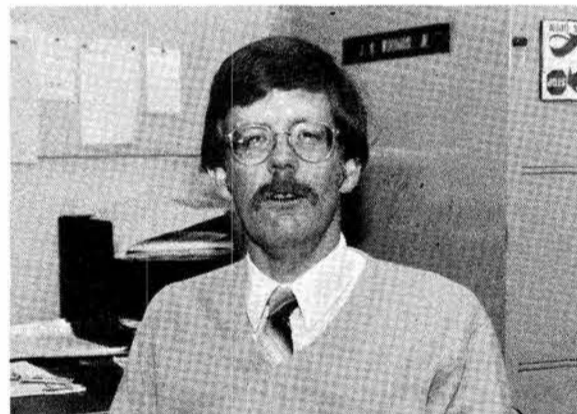
JOHN VITKO to supervisor of Systems Research Division 8328, effective Jan. 1.

He joined Sandia Livermore in November 1974, first working on spectroscopic studies of radiation damage and later doing studies of solar mirror durability and heliostat corrosion. Last April, John moved to the System Studies Department, investigating central receiver technology in high temperature applications.

His education includes a bachelor's degree in physics from Rensselaer Polytechnic Institute and a PhD in experimental solid state physics from Cornell.

John and his wife Katherine have two daughters and reside in Livermore. John enjoys family centered activities and is also active in his church.

* * *



JIM WOODARD to supervisor of Electronic Systems Division 8115, effective Jan. 1.

After a stint in the Army following college, he came to Sandia Livermore in 1974 where he first worked on an NRC transportation mode analysis in Systems Studies Division. He also worked on the Central Receiver Pilot Plant evaluation and other solar programs. In 1969, he moved to the Exploratory Systems Division to work on the Permissive Action Link (PAL) controller program, then on a gas transfer project.

Jim's education was at MIT where he received all his degrees, through PhD, in electrical engineering.

He and his wife Joan (also a Sandian in DSP) live in Pleasanton. Hobbies for Jim include gardening, cross country skiing and backpacking.

Congratulations

Julie Cooper (8450) and Fernando Uribe (8466), married in Kansas City, Mo., Dec. 19.

Chuck and Dawn Tockey (8212), a daughter, Christopher Robin, Dec. 4.



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IN FRONT of contractor-designed heliostat system are, from right to left, Dave King (4713), Bernard Ellis (Missouri Research Labs), Roger Aden, Chauncey Matthews, and Jerry Myers (all 4713). Receding into the background can be seen some of the other heliostats designed and built under Sandia Livermore's second-generation heliostat program. The heliostats were tested at the Albuquerque CRTF site under Dave's direction.

Heliostat Cost High, But Coming Down

"Some day heliostats should be competitive with nuclear energy—if they can be mass produced." So says Clay Mavis of Solar Components Division 8453 as he discusses Sandia Livermore's second-generation heliostat program.

"The first-generation heliostats are those at the Barstow pilot plant, with some installed at the Sandia Albuquerque Test Facility," explains Clay. "After selecting the Barstow heliostats, we realized that even mass production wouldn't make them cheap enough for commercial use. So, starting in July 1979, we let out 18-month contracts for the development of a less expensive heliostat to five contractors. Four of them completed their heliostat prototypes. The four designs were tested at Albuquerque's CRTF, while the mirror modules were tested at Livermore."

Each second-generation heliostat has 600 sq. ft. of mirror surface. By contrast, the Albuquerque CRTF has 222 heliostats each with 400 sq. ft. of mirrors, and Barstow has 1800 heliostats each with 430 sq. ft. of reflective surface.

"Costs are reduced by increasing the reflective area and beefing up the existing drive mechanisms, support structure, and base so the heliostat can still survive the windloads," says Clay. "Then we test the systems to make sure they're operational, and that they meet performance requirements—that is, that they'll survive 90-mph winds, hail, rain, snow, and ice."

"DOE's goal is to get the manufacturing costs down to less than \$100 a square meter in 1980 dollars. The contractors achieved designs which project about a \$75 reduction from the first-generation goals—

to between \$100 and \$120. General Motors, Ford Motor Company, and others have made detailed production plans and cost estimated that show costs will decrease to below \$90 a square meter after a few years of production.

"Heliostats are designed to last 30 years. To determine if they'll last that long, we run the system at an accelerated rate, dismantle it, and then examine the parts to determine the amount of wear on gears and other components."

Three of the contractors are now ready for orders and are seeking customers. The fourth, an oil company, is its own customer; they're building 30 heliostats to generate steam for use in their enhanced oil recovery program near Bakersfield. Most utilities are waiting until the Barstow pilot plant is operating and producing electricity before committing themselves to purchase of heliostats.

"The aim of Sandia Livermore's heliostat development program has always been to develop technology in industry, *not* to develop it in Sandia and then transfer it," says Clay. "As technical manager for the DOE heliostat program, Sandia has accomplished that goal with the second-generation heliostat program. The contractors have come up with four different designs whose price will be determined in the marketplace. There's nothing sacred about the costs we've come up with—the companies will set their own pricing strategies."

Dave King, assisted by Jerry Myers and Roger Aden (all 4713), was in charge of the testing at the SNLA CRTF.

Take Note

Chairman Art Arenholz (3520) of the 1981 ECP Committee has released his annual report on how we're doing in terms of giving. The figures speak for themselves: 86% of Sandians participate and, of those who participate, one-half give at the "fair share" level. Our average contribution is \$150.82, while the total pledged is a whopping \$889,978. Speaking from our experience with the South Highway 14 Village Project, we can affirm that Sandians are generous—once the need is made clear—and these ECP figures confirm that assessment. Incidentally, United Way awards are again being given to those Sandia organizations in which at least 75% of employees are participating at the fair share level. They are orgs. 400, 1410, 2360, 2540, 3160, 3240 and 4240.

* * *

"An opportunity to build your own solar water heater in a workshop setting" is how UNM's College of Engineering is touting its Solar Water Heater Workshop, scheduled twice: Jan. 29-30 and Feb. 19-20. "This 1½-day workshop will allow participants to learn the assembling, installation and maintenance of a domestic solar water heating system which can be purchased as a kit," it continues. The workshops will be held in UNM's Freshman Engineering Building. Cost is \$75. Send your name and organization to Solar Water Heater, LAB NEWS, if you want a copy of the information sheet and registration form.

* * *

All you clever types in arts and crafts who wish to exhibit in the annual Arts & Crafts Fair should get things moving by requesting an application form from the NM A&C Fair office, 884-9043, located at 2745 San Mateo NE, Suite G. The release states: "Three examples of work in each medium the applicant wishes to show, an entry fee and the the application form will be received . . . on Feb. 18 or 19 . . . Those artists and craftsmen whose work is chosen by the juries will become exhibitors . . ." (PS—If you become an exhibitor, let LAB NEWS know.)

* * *

Couple of French classes are being offered by *L'École de l'Alliance Française* and, no, it's not a school teaching dalliance. One course is in conversational French, the other is entitled Business French. Both start Feb. 1, run once a week during the evening for 12 weeks, and cost is \$48. Course coordinator is Margery Storrs of the Alliance Française, who may be reached on 821-5788.

Another language, Chinese, is offered under the sponsorship of UNM. A 12-week course (beginning, intermediate, and advanced) starts Jan. 31. Classes run from 2-4 p.m. on Sundays. Fee is \$25. Margaret Chu (4313) is one of the instructors. Call her on 4-9931 or 293-4375 for more information; or Helen Chen, 4-1955 or 298-2422.

* * *

The Sanado Woman's Club is holding its annual Valentine's party on Monday



RAY BEALL (3421) and BUD NEWMAN (1213)

Supervisory Appointments

RAY BEALL to supervisor of Motor Pool Division 3421, effective Jan. 16.

Ray joined Sandia's shipping and receiving organization in 1948. He also worked as a high explosives handler and was a scheduler for the development shops. Since 1967, he has been supervisor of the Administration & Control Section in the Motor Pool Division.

His hobbies include raising and racing thoroughbred horses, as well as hunting and fishing. He and his wife Anna have two sons and one grandchild. The Bealls live in Bosque Farms.

BUD NEWMAN to supervisor of Weapon Training Division 1213, effective Jan. 1.

Bud has been a staff member with the Weapon Training Division since joining the Labs in 1952.

He earned his BS in physics from the University of Wyoming. After a year of graduate work at the University of Wisconsin, he returned to Wyoming to teach while completing course requirements for an MS in physics.

Bud is active in his church; other interests include building projects at his mountain cabin in the upper Pecos country. He and his wife Betty have three children and live in NE Albuquerque.

evening, Feb. 8, at the NCO Club East. "Bring your husband, children, or other guests. Entertainment . . . by the Eldorado Swing Choir, GOLDRUSH . . . no-host bar at 6, buffet at 7, program at 8." Reservations: Carolyn on 266-9927 or Maurine on 299-8765 by Feb. 2.

* * *

The Los Alamos Choral Society, 75 strong, is making its Albuquerque debut next weekend, Friday, Jan. 29, at 8 p.m. It will present Joseph Haydn's oratorio, *The Creation*, and will be accompanied by the Los Alamos Sinfonietta. Locale is the First United Methodist Church at 4th and Lead SW. Tickets run \$4, \$2.50 for students and seniors, and are available at Popejoy, UNM Student Union, Sears at Coronado, Natural Sound, NM Symphony office and Bob Farley Music Center.

* * *

February 21 has been declared German American Day in New Mexico by Gov. Bruce King, and to mark the occasion, Edelweiss am Rio Grande, Albuquerque's German American Club, is sponsoring public festivities. Highlights will be the first annual Fasching Parade and a beer and sausage festival under a huge tent near the club headquarters at 4817 Menaul NE. Fasching is the Teutonic answer to Mardi Gras and—it says here—"It's party after party . . . The days when you forget your troubles." For more info, contact Herr Larry Lopez at 4-5965. So bring on the *Knackwurst und grüne Chile*.

Co-workers of Rose Brigham in Division 3255 agree that she is a super secretary. So they wrote to a local radio station which is sponsoring an "Employee of the Week" competition, and Rose was selected as KKJY's Employee of the Week, Jan. 3-9. She received an engraved plaque denoting the occasion, and her name was announced during that week as their weekly winner.

Events Calendar

- Jan. 22-23—NM Ballet Company with Fernando Bujones and Nancy Roffa, 8:15 p.m., Popejoy.
- Jan. 22-24—Ice Follies, Tingley Coliseum, 243-3208.
- Jan. 22-24, 29-31—"Diversions & Delights," The Vortex, 2004½ Central SE, Fri. & Sat., 8 p.m., Sun. 2:30 p.m., 247-8600.
- Jan. 22-Feb. 7—"The Hostage," Albuquerque Little Theater, 242-4315.
- Jan. 24—Aulos Ensemble, baroque chamber music, Fine Arts Music Series, First United Methodist Church, 4 p.m.
- Jan. 24—The Irish Rovers, 8:15 p.m., Popejoy.
- Jan. 25—Audubon film, "African Wildlife," 7:30 p.m., Popejoy.
- Jan. 26—Jury's Irish Cabaret of Dublin, 8:15 p.m., Popejoy.
- Jan. 30-31—Albuquerque Children's Theater, "Snow White," 1:30 & 3:30 p.m., Popejoy.
- Feb. 4-6—"The Taming of the Shrew," 8:15 p.m., Popejoy, 277-3121.
- Feb. 5—Zia Track Meet, 7 p.m., Tingley Coliseum.

Fun & Games

Skiing—The white stuff is here . . . just waiting for your old rubber legs. Some possibilities: how about a moonlight cross country ski trek in the Sandias? C-Club Rec Manager Tom Lenz says “. . . it would consist of a leisurely glide through the Sandias at dusk to a base camp where food and drink would be waiting.” Tom’s on 4-8486, and he’s planning the full moon trip for Feb. 7. If you prefer downhill, the Coronado Ski Club has compiled a bunch of phone numbers you can call to get skiing conditions. Here are a few: for all state ski conditions in New Mexico, (900) 976-3710; three local numbers that give conditions at areas in the state and in nearby Colorado are 243-7547, 262-0780, and 884-9292 (these are radio stations). A word of caution: ski condition reports, usually provided by the ski areas, tend to be a form of creative writing.

* * *

Shooting—Dave Bennett (4415) reports that construction is about to begin, at long last, on the Albuquerque Shooting Range Park, a public range to be located on the west mesa about five miles west of the volcanoes. The initial construction will include roads, a range house, archery ranges, an area for conducting hunter training, two trap and two skeet fields, and three rifle/pistol ranges (a 200-yard muzzleloading range, a sighting-in range and a police combat range). Funding is provided by the State Parks Department. The range will be operated by the city. The master plan for the facility and the design of the first phase were the responsibility of a committee chaired by Dave.

Also on the shooting scene, Sandia’s airgun and .22 target shooters will again be participating in the national postal competition with rifle and pistol. Dave Overmier (1585) is the contact and he can be reached on 4-3436.

* * *

Racquetball—Glenn Jarrell (5541) is continuing to organize a racquetball ladder for singles play. Call him on 4-4138. Play starts in February.

Retiring



Lewis Pearl (3435)



Robert Gray (2561), Carl Frantz (1422), Larry Avila (3426), Cecil Tolbert (5634) and Art Cordova (2561).



NEW CRAY COMPUTER arrived at Sandia early last week, was gently removed from the truck and moved into the Central Computing Facility in Bldg. 880 where underfloor conduits were ready for connecting the powerful Class VI machine into Sandia’s scientific computing network. Paul Lempke, supervisor of Scientific Computing Systems Design Division 2635 (standing at right), reports that the new Cray should be operating next week.

Hockey—Is a game played with a puck and, as in playing the harp, it takes a lot of pluck. Albuquerque’s 30-30 Hockey Club is looking for experienced players to fill vacancies on their four teams. You should be 30 or over. Play follows NHL rules, modified to minimize body contact. Contact: Bill Dyroff, 266-0077, or Rol Hewitt, 888-3199.

* * *

Biking—Last time we described the potential peril to a biker who sidles up on the right-hand side of a car awaiting a signal change. When the light changes and the car turns right, the biker may have a problem. Solutions proffered by readers include the following: “Bikers should regard themselves as vehicular traffic and not try to create separate (outside) lanes . . . stay in the middle of the normal right-turn lane and await your turn . . .” (Ken Hunter, 1312); “The car is required



by law to signal, so I sit on the car’s bumper . . . if he turns right, that’s OK, if not, that’s OK, too. Of course, if there’s a bike lane, the biker has to stay right . . .” (Lyle Schultz, 4325); “I have one of those freon air horns that sounds like the Super Chief approaching a crossing . . . when he right turns and ignores me, I give him a blast. It gets his attention . . .” (Craig Jones, 2610).

Sympathy

To Bob Varga (1322) on the death of his father at Bluewater Lake, Jan. 1.

To Norman Wing (5112) on the death of his mother in Kansas, Dec. 15.

To Eddie Torres (3618) on the death of his son, Dino, in Albuquerque, Jan. 10.

To Billy Hickerson (4372) on the death of his wife in Albuquerque, Jan. 14.

Congratulations

Judy Jewell (1768) and Charles Baldwin, II, a son, Charles Carroll, Nov. 13.

Pat (1721) and Kerrie (1763) Sena, a son, Michael Phillip, Jan. 8.

Claudia Bolton (3613) and Larry Jeffery, married in Albuquerque, Jan. 2.

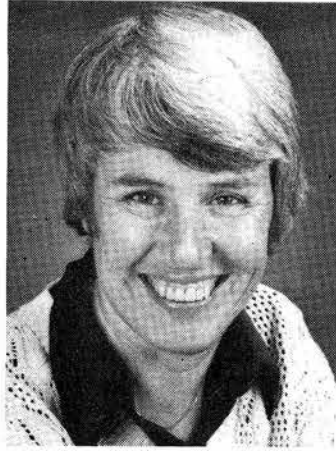
Jack (1471) and Yvonne Strascina, a daughter, Meghan Suzanne, Jan. 14.

To Robert (2551) and Cathy Foster (2431), a son, Kyle, Dec. 25.

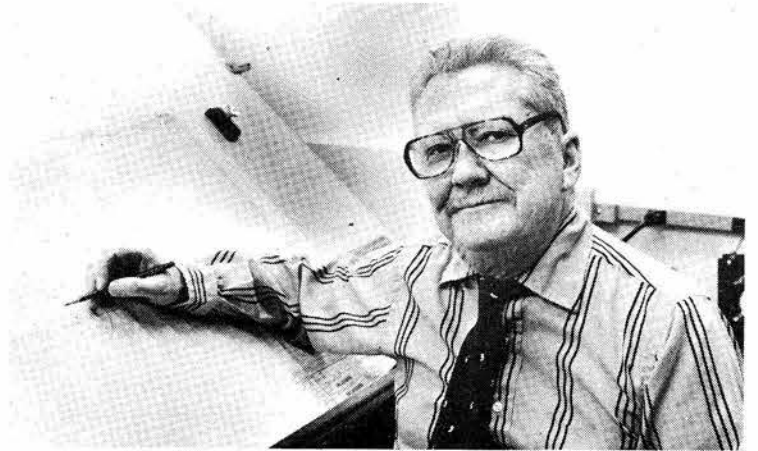
MILEPOSTS

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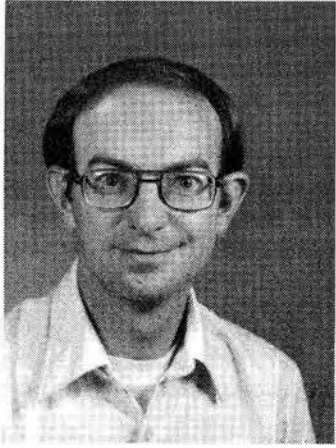
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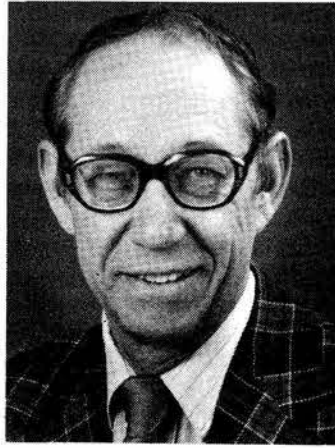
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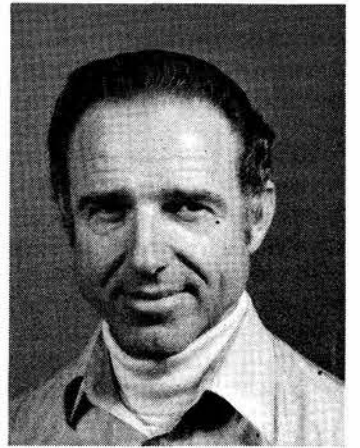
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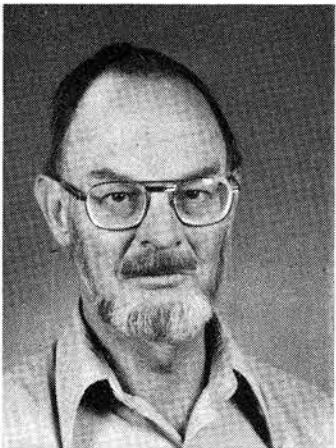
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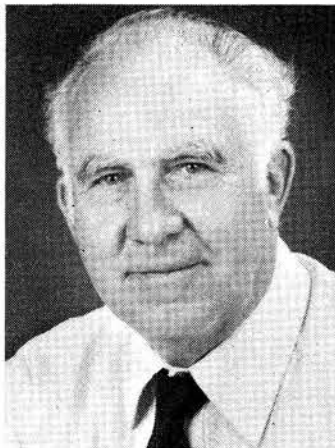
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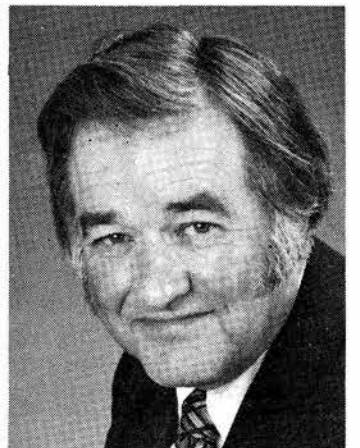
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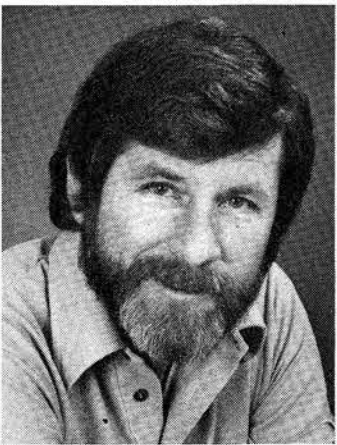
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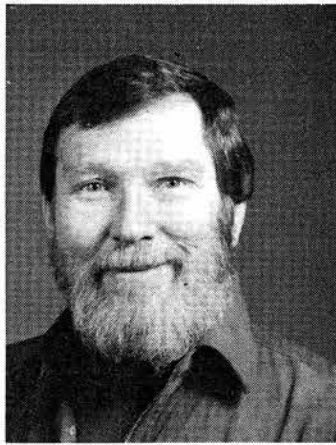
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Marv Glaze - 8260 30



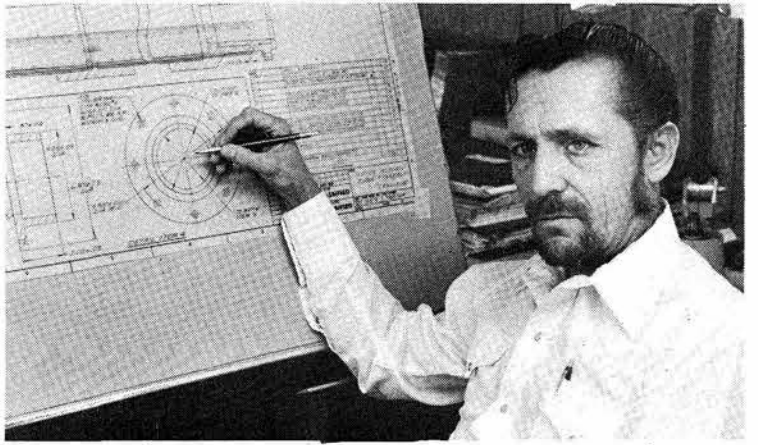
Ron Allen - 8262 20



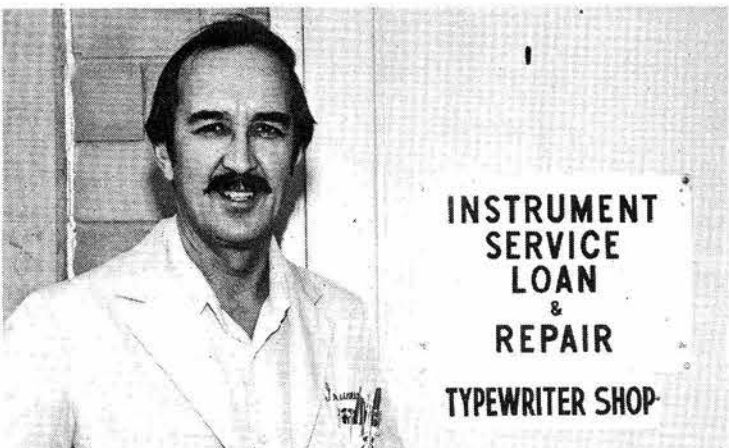
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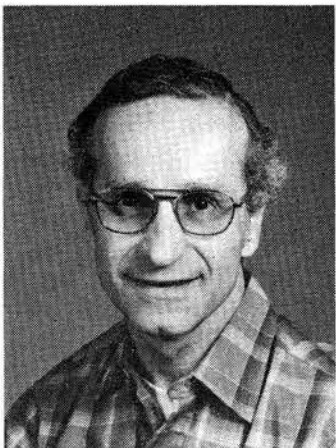
Bob Wehrle - 2522 30



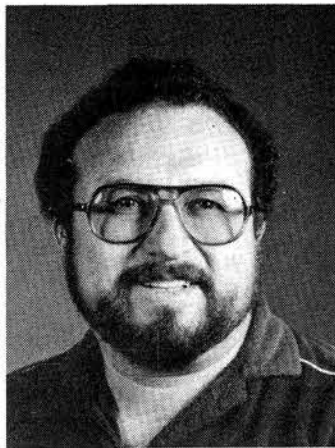
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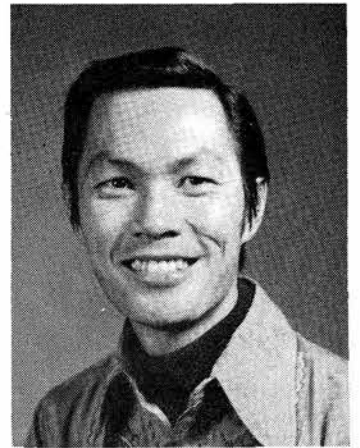
Jim Sanchez - 3422 25



Sam Levy - 2523 20



Cecil Tafoya - 3154 15



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Little Effect Seen Here

President Dacey: Divestiture & Sandia

For most of us, "divestiture" is one of those words not totally strange yet not entirely meaningful. To Bell System employees, however, divestiture is likely in coming months to become a household word, especially when it is associated with the parent company, American Telephone & Telegraph, fabled AT&T. Briefly, it refers to the splitting up of the world's largest corporation, with the new AT&T shedding or "divesting" local service in all of the 22 operating telephone companies (Mt. Bell, Pacific Telephone, New England Bell, and the like) so that these become independent entities, while retaining three major elements: Bell Labs, Western Electric and Long Lines (which operates the long distance network).

LAB NEWS interviewed George Dacey, our president since last August and a veteran executive of Bell Labs, concerning AT&T's landmark settlement with the Department of Justice.

Lab News—What effect do you see divestiture producing within the Bell System and, more particularly, within Sandia?

Mr. Dacey—Within Sandia I foresee little effect. Of all possible arrangements that might have come about—including one in which Western Electric was divided up and became a part of the divestiture package—I think that the agreement which permits Bell Labs, Western and Long Lines to remain together is perhaps the best we could have hoped for, both for the Bell System and for Sandia.

Lab News—Why for Sandia?

Mr. Dacey—Well, suppose Western were to have become divided and independent. Do we, Sandia, stay associated with WE, or with Bell Labs, or what? Some sort of new contract might have had to be negotiated, and that's always a delicate process. Our present five-year contract with WE runs through September of '83, and I see no need for any change in it. Furthermore, renewal when it comes up should be a fairly straightforward matter as well.

Lab News—And employee benefits and things like that?

Mr. Dacey—No change. That's another favorable aspect of this for us. We keep the same pension plan and our existing schedule of benefits.

Lab News—We have to be a pretty small piece of the AT&T corporate pie. And they gain no revenue from us—so why do they bother?

Mr. Dacey—We're small, perhaps, but Sandia is vital in the national defense picture. AT&T continues this relationship as a public service, something they strongly subscribe to and actively support.

Lab News—What about the future for Bell Labs and WE?

Mr. Dacey—Consider first that their capability in R&D and manufacturing will be very formidable in what will become an unregulated marketplace. Western can now continue in its traditional markets and, freed from the 1956 consent decree, it can enter other totally new markets as well. I think their future is bright indeed.

Lab News—One other aspect of divestiture that has meaning for Sandians relates to our wide ownership of AT&T stock, thanks to BSSP and other stock ownership plans. Is this a good development for AT&T owners?

Mr. Dacey—I'm certainly inclined to think so. AT&T was a winner before divestiture, in spite of burdensome regulations. Now much of that restriction has been removed, giving them more of a free hand. The new AT&T will do well, I'm confident.

Donald Procknow, President of Western Electric, on Divestiture

Dear Fellow Employee:

The proposed consent decree modification agreed upon by AT&T and the Department of Justice last Friday is of vital importance to Western Electric and all its employees and holds promise for a brighter future for our business.

In a broad sense, the agreement means that Western Electric will remain united with its partners, Bell Laboratories, Long Lines and AT&T, and will be able to pursue the opportunities of an open market.

The agreement also means in a personal sense that Western Electric employees now can pursue their jobs with a renewed sense of purpose, with much less uncertainty about the future of our business. I know, too, that our employees appreciate there will be no change in their pension or other benefits because of the consent decree.

Our future is one of stimulating challenge and enormous opportunity. It is a future in which the restructured Bell System will be able to apply the legendary research and development skills of Bell Labs, the innovative manufacturing and service capacity of Western Electric and the management expertise of AT&T to take advantage of new market opportunities . . .

Charles Brown, Chairman, AT&T, Discusses Divestiture And New Objectives



This is an historic decision, one not easily reached when you seek to balance the interests of tens of millions of consumers, the rights of three million share owners, an important obligation to one million employees, our duty to assure national defense communications and our singular role in the partnership which manages that unique national resource, the best communications system in the world . . .

From our perspective, these are the objectives which will be well-served by the outcome.

- Local exchange phone service will be completely under the jurisdiction of each state. Consumers will be assured telephone service under terms, conditions and at rates authorized by the state public utility commissions. Those commissions have a deep interest in assuring healthy, modern, growing telephone companies.
- The local companies will devote all of their considerable resources toward creating all-purpose local communications delivery systems. Their engineering and marketing objective will be to provide local exchange access for all of the services and systems which may be available to consumers from whatever source.
- The procurement practices of the local companies will no longer be at issue. Supplies and equipment will be purchased from many sources, including Western Electric, not only in the existing competitive market, but at arms length as well.
- The local companies will be separated from AT&T in sound financial condition, well positioned in a growth industry and possessed of all the necessary resources to prosper as they acquire new technologies and continue to enlarge the usefulness of communications services.
- An integrated, centrally coordinated nationwide long distance system will be preserved, taking explicit account of national defense requirements.
- Competition as between the many companies which seek to sell equipment and offer inter-city communications services will be further encouraged, with parity of access to local markets among the competitors. The American consumer will go shopping in a free market and Bell services will be among the choices available.
- Most share owners are individuals with modest holdings. They will now own shares in separate enterprises which represent the very same assets they own now, but from which the cloud of legal uncertainty has been removed.
- Bell System employees will pursue their jobs with a renewed sense of purpose. Most of our people joined this business with the expectation of making a career of it. They will surely know what I mean when I say how good it will feel to be able once again to plan and manage your life without worrying that your job may hinge on the outcome of litigation or new layers of government-imposed constraints rather than upon your own labor and enterprise.
- Bell System scientists and engineers will be free to challenge new frontiers and conceive new applications of electronics technology and their efforts will be rewarded—or not—in the competitive marketplace, worldwide.

Significantly, the research institution most responsible for America's world leadership in electronics—the Bell Laboratories—is preserved intact. And we fully intend that its resources will continue to be directed toward an outpouring of innovation that will find application in local exchanges as well as in the services offered by AT&T in the competitive marketplace.

- Western Electric, the primary financial support of Bell Laboratories, will continue to excel as an intensely competitive telecommunications manufacturer.

This agreement at once confirms the central elements of what we believe to be national policy and disposes of debilitating uncertainties which have delayed investment decisions, inhibited innovation and threatened both the equity of our share owners and the future of our employees. We truly believe the consent order is an alternative which meets the relevant tests of the public interest and we look forward to getting out of court and getting back to business.